Computer-Based Instruments

NI 6830 User Manual

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Conventions

The following conventions are used in this manual:

<>	Angle brackets enclose the name of a key on the keyboard—for example, <shift>. Angle brackets containing numbers separated by an ellipsis represent a range of values associated with a bit or signal name—for example, DBIO<3..0>.
»	The **»** symbol leads you through nested menu items and dialog box options to a final action. The sequence **File»Page Setup»Options»Substitute Fonts** directs you to pull down the **File** menu, select the **Page Setup** item, select **Options**, and finally select the **Substitute Fonts** options from the last dialog box.
♦	The ♦ symbol indicates that the text following it applies only to a specific ISDN network type.
☞	This icon to the left of bold italicized text denotes a note, which alerts you to important information.
bold	Bold text denotes the names of menus, menu items, parameters, dialog boxes, dialog box buttons or options, icons, windows, Windows 95 tabs, or LEDs.
bold italic	Bold italic text denotes an activity objective, note, caution, or warning.
italic	Italic text denotes variables, emphasis, a cross reference, or an introduction to a key concept. This font also denotes text from which you supply the appropriate word or value, as in NI-DAQ 6.*x*.
`monospace`	Text in this font denotes text or characters that you should literally enter from the keyboard, sections of code, programming examples, and syntax examples. This font is also used for the proper names of disk drives, paths, directories, programs, subprograms, subroutines, device names, functions, operations, variables, filenames and extensions, and for statements and comments taken from programs.
NI 6830	NI 6830 refers to the NI 6830 Basic Rate ISDN Tester.
paths	Paths in this manual are denoted using backslashes (\) to separate drive names, directories, folders, and files.

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1

Using the NI 6830 Basic Rate ISDN Tester

Thank you for purchasing a National Instruments NI 6830 Basic Rate ISDN Tester. The NI 6830 allows you to perform the most common tests for the installation and basic maintenance of integrated digital services network (ISDN) lines.

The NI 6830 makes ISDN testing simple. To start the software, double click the **ISDN Tester** icon on the desktop of your computer. You can access all the functions of the NI 6830 from a single main screen. The NI 6830 main screen is shown in Figure 1-1.

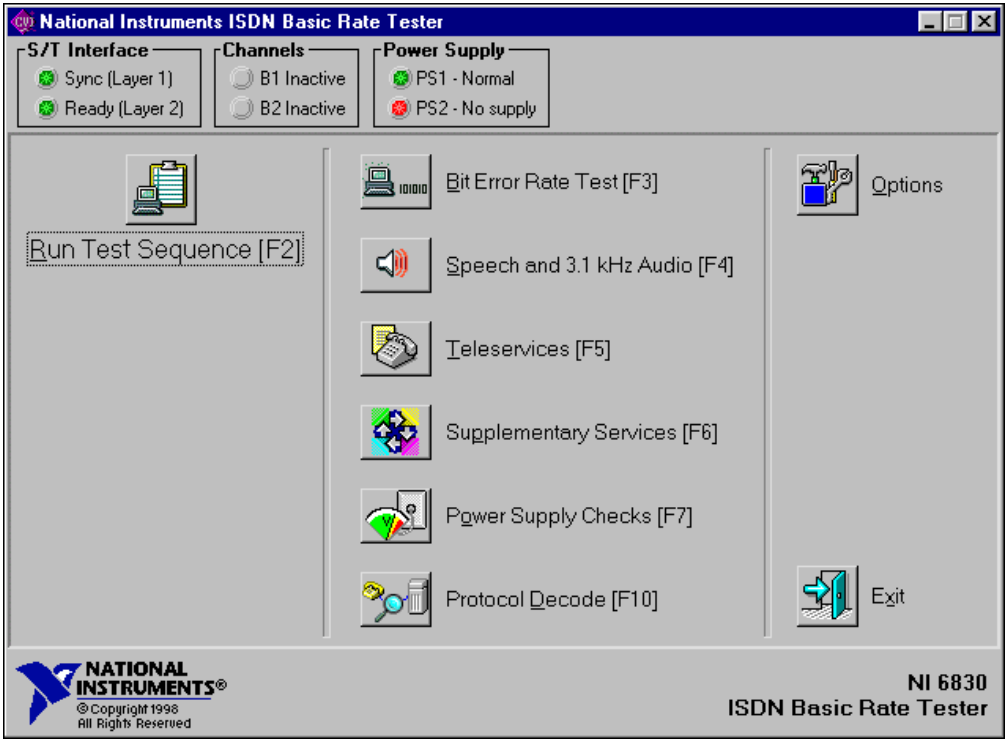

Figure 1-1. Main Screen

You can select any of the functions on the main screen using a pointing device such as a mouse, mousepad, or trackball; by pressing the associated function key <F*x*>; or by pressing <Alt> and the letter underlined in the function. All the main screen features are discussed in detail later in this chapter.

Note ***You can run all the tests except the* Power Supply Checks *on either the U or S/T interface.* Power Supply Checks *are for the S/T interface only. You can select the U or S/T interface under* Options»ISDN Interface.***

The following items are found on the main screen:

- The status bar at the top of the screen shows the status of the U or S/T interface, B channel activity, and the S/T power supplies.

- **Run Test Sequence** runs a predefined sequence of ISDN tests.

- **Bit Error Rate Test** performs a Bit Error Rate Test (BERT) or a Bit Errored Seconds Test (BEST).

- **Speech and 3.1 kHz Audio** tests speech and audio carried on a B channel.

- **Teleservices** verifies the teleservices programmed at the central office for the ISDN line you are testing.

- **Supplementary Services** verifies the supplementary services programmed at the central office for the ISDN line you are testing.

- **Power Supply Check** verifies the status of the S/T interface power supplies. This function is hidden when you select the U interface.

- **Protocol Decode** displays the layer 2 and layer 3 messages that are exchanged between the central office and the NI 6830.

- **Options** changes the general settings of the NI 6830 Basic Rate ISDN Tester.

- **Exit** exits the NI 6830 software.

Startup Tests

♦ Networks without service profile identifier (SPID)

Before you start testing the ISDN line, enter the phone numbers provisioned for this location. On startup, you see the dialog box shown in Figure 1-2. Enter customer numbers into the appropriate fields. If only one

number is assigned, leave the second field blank. If both numbers are the same, you can use the **Copy Numbers** button to copy the number from first field into the second. Once you finished entering the numbers, click the **OK** button.

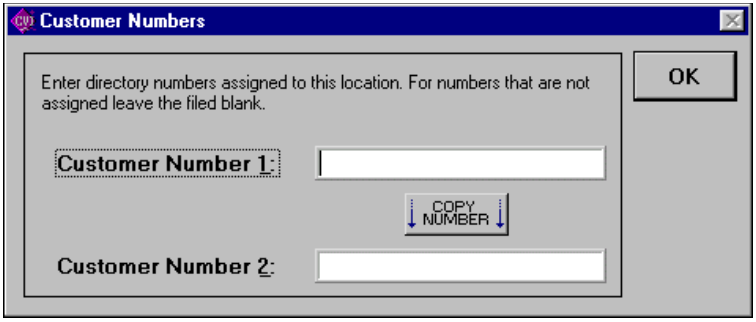
Customer Numbers
Enter directory numbers assigned to this location. For numbers that are not assigned leave the filed blank.
OK
Customer Number 1:
COPY NUMBER
Customer Number 2:

Figure 1-2. Customer Numbers Dialog Box wIthout SPID

To change these numbers later, use **Options»Terminal** page. If you do not want to be prompted to enter customer numbers, you can disable this feature on the **Options»General** page.

- Networks with SPID

  Before you can conduct any tests, you must enter the directory numbers and SPIDs provisioned for this line. You are prompted with the dialog box shown in Figure 1-3 to input this information. Enter directory numbers and SPIDs into the appropriate fields. If the SPID format has been configured, the software automatically generates the SPID based on the phone number entered. You can also click the **SPID** button next to the **Customer Number** field to generate a SPID based on predefined format. If the SPID is not

generated automatically, you must enter it manually. Once you finished entering the numbers and SPIDs, click the **OK** button.

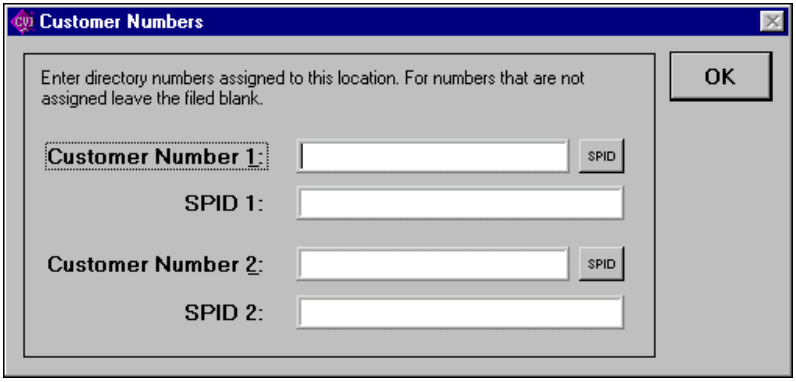

Figure 1-3. Customer Numbers Dialog Box with SPIDs

To change the directory numbers and SPIDs later, use the **Options»Terminal** page. If you do not want to be prompted to enter customer numbers and SPIDs, you can disable this feature on the **Options»General** page.

Status Bar

The NI 6830 has the status bar, shown in Figure 1-4, at the top of the main screen.

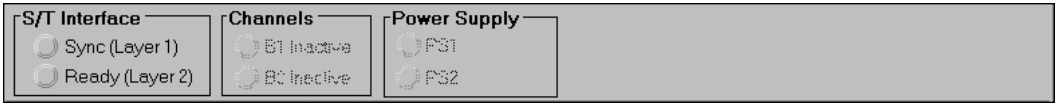

Figure 1-4. Status Bar

The status bar is divided into boxes showing ISDN interface status, bearer channel usage, and the state of the ISDN power supply.

Interface

The interface box displays the status of the ISDN connection between the central office and the subscriber on the U or S/T interface. You can select the U or S/T interface under **Options»Interface**. See *Options* later in this chapter for more information.

A green LED for **Sync** (Layer 1) indicates connection at protocol layer 1 (physical layer). If the green light does not come on, it could mean one of the following:

- The NI 6830 is not connected to the line.
- A cable is connected to the wrong interface.
- The line is not connected to the ISDN line card in the central office.
- There is a problem with the twisted pair wiring between the central office and the customer.

A green LED for **Ready** (Layer 2) indicates that the connection was established at protocol layer 2 (data link layer) and the line is ready for placing calls.

♦ Networks without SPID

If the green light does not come on, the central office switch is probably unable to assign a terminal end-point identifiers (TEI) to this line. Check with the central office personnel to make sure that the switch is operating correctly.

♦ Networks with SPID

If the green light does not come on, the central office switch is probably unable to assign a TEI to this line. Check with the central office personnel to make sure that the switch is operating correctly.

If the yellow light comes on, the tester is ready to download SPID information. Make sure that you entered the correct SPIDs by checking the **Options»Terminal** page.

If the red light comes on, it means that the tester tried to download the SPIDs, but they were rejected by the central office. Make sure that the SPID information is correct by checking the **Options»Terminal** page.

Channels

The Channels box indicates activity on the B1 and B2 channels. An orange LED indicates that the corresponding B channel is active. A gray LED indicates that the corresponding B channel is inactive. The LEDs remain disabled if the NI 6830 is not connected to the line.

Power Supply

This Power Supply box shows the status of the S/T power supplies PS1 and PS2. A green LED indicates normal power supply voltage. A yellow LED indicates restricted supply voltage. A red LED indicates no power supply voltage, or that the power supply is too high.

☞ **Note** ***The Power Supply box is hidden if you are testing the U interface.***

Run Test Sequence

Run Test Sequence allows you to quickly perform a predefined sequence of tests. You can create sequences with the Sequence Editor. See Chapter 2, *Using the NI 6830 Sequence Editor*, for more information on the Sequence Editor.

- Networks without SPID

You see the dialog box shown in Figure 1-5 when you select the **Run Test Sequence** icon.

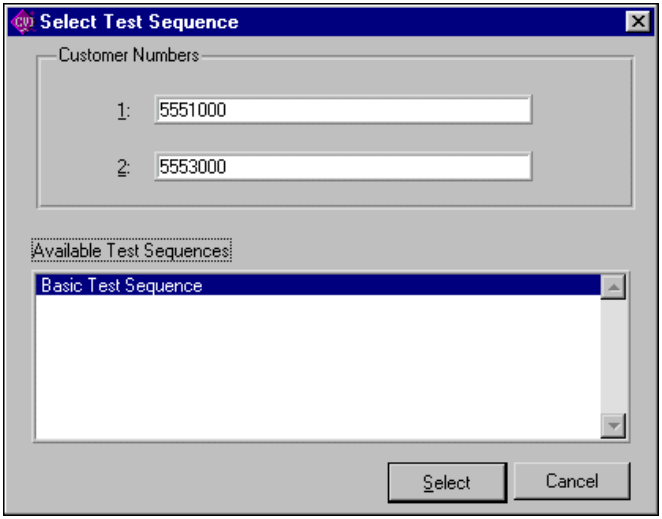

Figure 1-5. Select Test Sequence without SPID

- Networks with SPID

You see the dialog box shown in Figure 1-6 when you select **Run Test Sequence**.

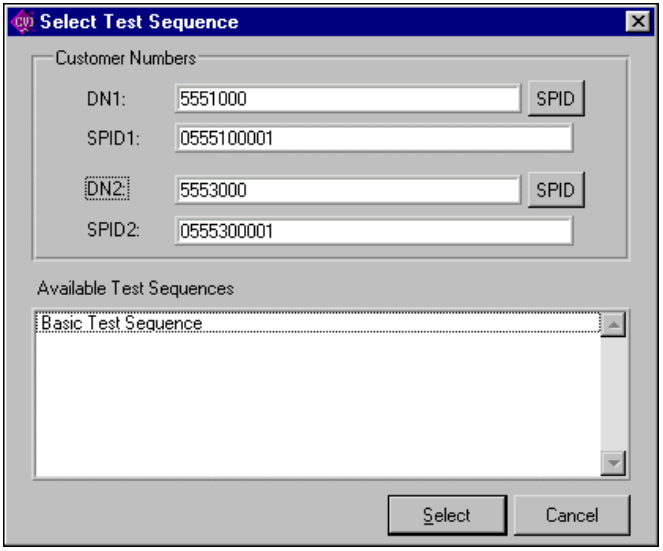

Figure 1-6. Select Test Sequence with SPID

The dialog box shows the numbers assigned to the customer. You can change the customer numbers by typing over the displayed numbers.

The dialog box also lists the available sequences. You can highlight a test sequence by moving up and down the list with the pointing device or with the up and down arrow keys.

Note ***Your dialog box shows different sequences if they have been created using the* Sequence Editor*, described in Chapter 2,*** *Using the NI 6830 Sequence Editor*.

Click **Cancel** to exit without selecting a test sequence.

Highlight a sequence in the Available Test Sequences list box, then click **Select** to run the sequence you selected. The NI 6830 displays an **ISDN Test Sequencer** screen similar to the one shown in Figure 1-7.

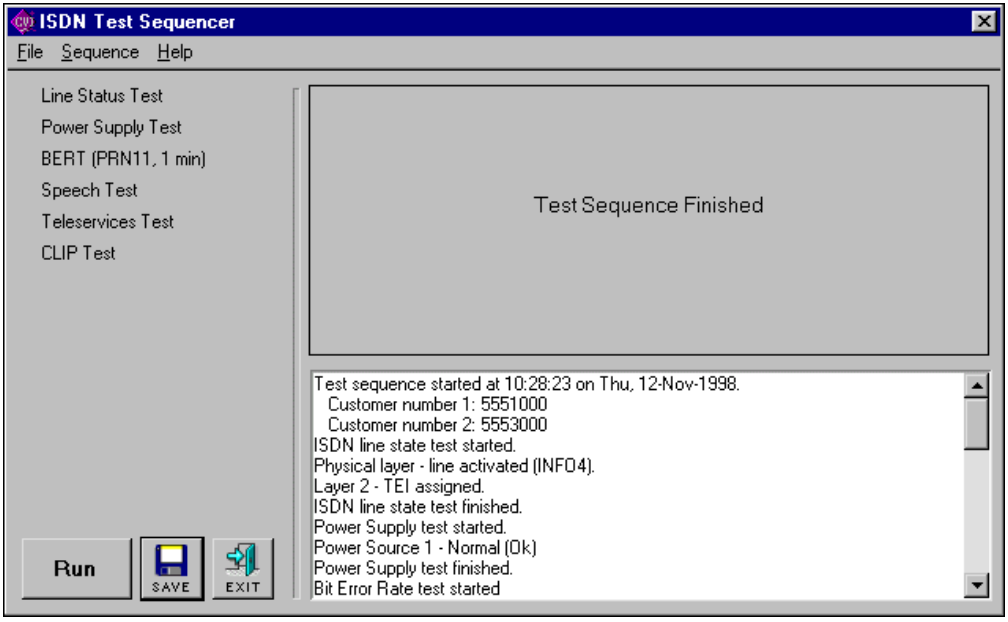

Figure 1-7. NI ISDN Test Sequencer

The NI 6830 displays a list of the tests on the left side of the screen, the user interface of each individual test, as it is performed, in the upper right side of the screen, and a log of results in the lower right area of the screen.

Figure 1-8 shows the NI ISDN Test Sequencer dialog box while tests are ongoing.

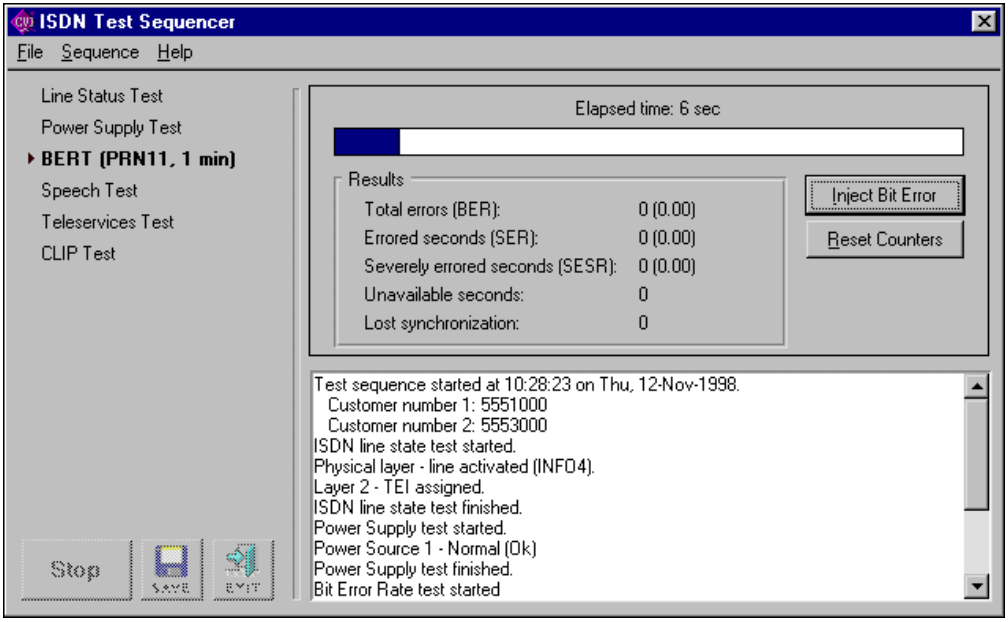

Figure 1-8. NI ISDN Test Sequencer Dialog Box While Tests Are in Progress

Click the **Run** button to run the test sequence.

Click the **Save** icon to save the test sequence results to a file. If you select Save, a dialog box prompts you for the name and location of the file you want to save.

Click the **Exit** icon to return to the main screen.

Click the **Stop** button, if highlighted, to stop the test sequence. You cannot stop some test sequences. For these test sequences the **Stop** button is grayed out.

The tests in a sequence are identical to the individual tests run directly from the main screen. See the individual function tests for additional information.

Bit Error Rate Test

The BERT is the most common test performed on an ISDN line after you make the connection. There are two ways to perform a BERT—either end-to-end or self-call.

When performing an end-to-end test, the NI 6830 sends a digital pattern from one B channel to a Basic Rate Interface Test Line (BRITL) at the central office or to another NI 6830. The far-end device loops the pattern back on the same channel. A bit error indicates a difference of one bit between the transmitted and received patterns.

When performing the self-call test, the ISDN tester sends a digital pattern from one B channel to the other through the central office switch. A bit error indicates a difference of one bit between the transmitted and received patterns.

If you receive no bit errors for a certain period of time, the connection is considered good. A BERT performed over time is also called a Bit Errored Second Test (BEST), or a Severely Errored Second Test. Check your local procedures to determine the duration of this test.

Bit errors do not occur very often on pairs that are properly prequalified. Bit errors usually indicate problems with either the line or the equipment.

Figure 1-9 shows the **Bit Error Rate Test** dialog box.

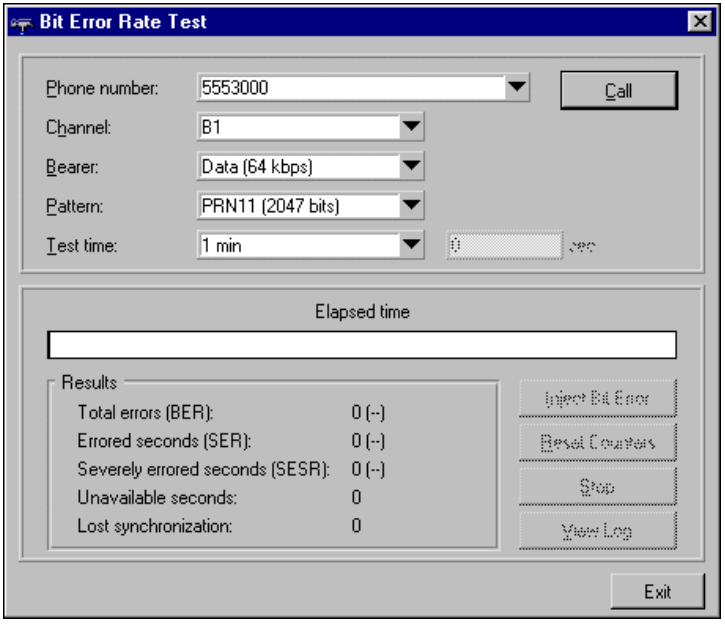

Figure 1-9. Bit Error Rate Test

The **Bit Error Rate Test** dialog box has the following setup options:

- Phone number—Type in the number to dial or use the down arrow button to select the telephone number to dial. You can select recently dialed numbers, numbers for this location, or stored numbers. You can add phone numbers to the list under **Options»Stored Numbers**.
- Channel—Use the down arrow button to select the bearer channel, B1 or B2, or to select Auto-select, allowing the NI 6830 to choose the channel.
- Bearer—Use the down arrow button to select the bearer service—either 64 kbps data or speech.
- Pattern—Use the down arrow button to select the pseudorandom pattern PRN9 (511 bits), PRN11 (2047 bits), or PRN15 (32767 bits) you want to send.
- Test time—Use the down arrow button to select the duration of the Bit Error Rate Test at either 1 min, 5 min, 15 min, or 1 hour. You can also choose to run the test continuously or to enter a custom period of time.

Click the **Call** button when you are ready to start the Bit Error Rate Test. While the test is running, you see the elapsed time in the status bar and the

results as they are calculated. You also have the following options while running the test:

- **Inject Bit Error**—Click this button to inject a single bit error into the transmitted bit stream. You should then see the number of detected bit errors increase by one.
- **Reset Counters**—Click this button to reset all test results to zero.
- **Stop**—Click this button to stop the test.
- **View Log**—Click this button to view the contents of the Bit Error Rate Test log. The log contains parameters and results of all BERTs obtained in the current session, as well as lost synchronization conditions.

You see the following test results during the Bit Error Rate Test and after the test is completed:

- Total errors—This is the total number of bit errors.
- Errored seconds—This is the number of seconds that had at least one bit error.
- Severely errored seconds—This is the number of seconds that had substantial bit errors.
- Unavailable seconds—This is the number of seconds that were not available for receiving data.
- Lost synchronization—This is the number of times that synchronization pattern was lost during the test.

Speech and 3.1 kHz Audio Test

The Speech and 3.1 kHz Audio test is a common ISDN test used to check the quality of speech on a B channel. As with a BERT, you can perform either an end-to-end or a self-call test. For either test, you can listen to the received audio on your computer speaker to verify the transmitted quality. Figure 1-10 shows the **Speech and 3.1 kHz Audio Test** dialog box.

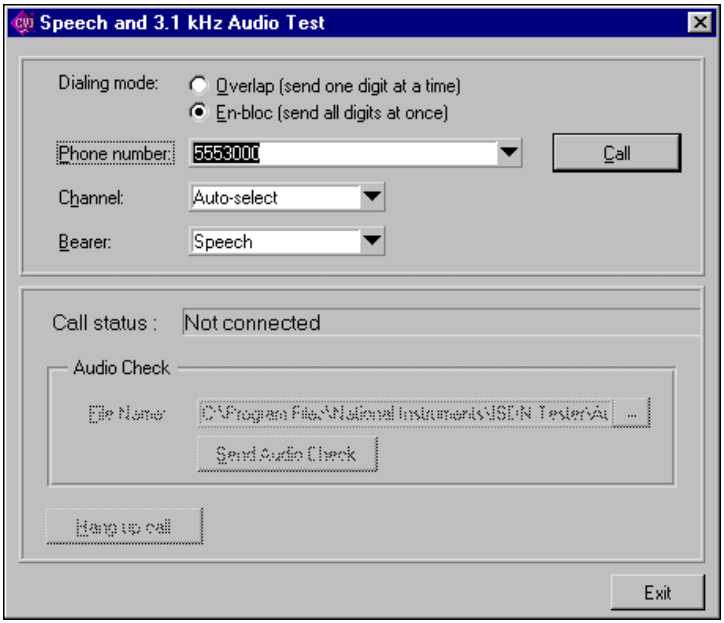

Figure 1-10. Speech and 3.1 kHz Audio Test

The **Speech and 3.1 kHz Audio Test** screen has the following setup options:

- Dialing mode—Select Overlap to dial one digit at a time, or En-bloc to dial all the digits at one time. A keypad appears when you click the **Call** button as shown in Figure 1-11.

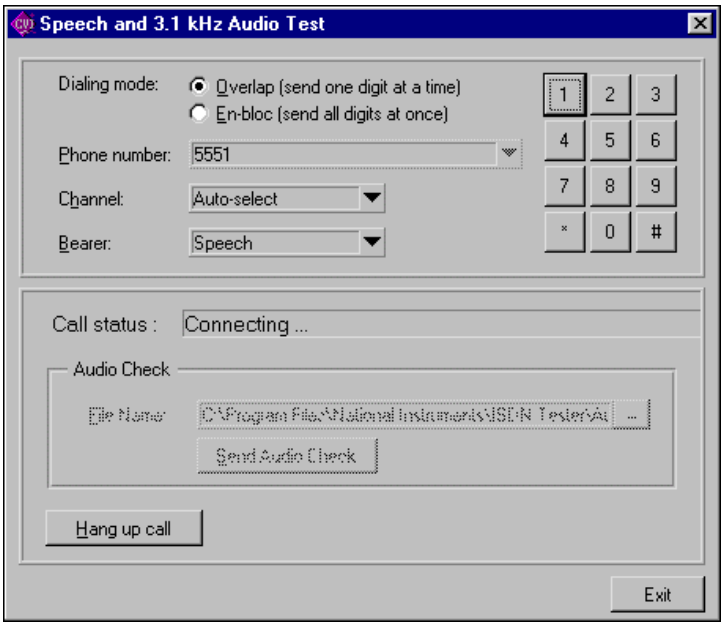

Figure 1-11. Speech and 3.1 kHz Audio Test Showing Keypad

- Phone number—Type in the number to dial or use the down arrow button to select the telephone number to dial. You can select recently dialed numbers, numbers for this location, or stored numbers. You can add phone numbers to the list under **Options»Stored Numbers**.
- Channel—Use the down arrow button to select the bearer channel, B1 or B2, or select Auto-select, allowing the NI 6830 to choose the channel.
- Bearer—Use the down arrow button to select the bearer service—either Speech or 3.1 kHz Audio.

Click the **Call** button when you are ready to start the Speech and 3.1 kHz Audio test. The NI 6830 shows the call status of the call in progress in the call status box.

Once the connection is made, you can see the name of the last file that was audio selected in the Audio Check box. Click **Send Audio Check** to use the displayed file.

Click **Hang up call** to end the call. Click **Exit** to return to the main screen.

Teleservices Verification

Teleservices verification is a test used to confirm that the central office is programmed with the teleservices the subscriber requested. All teleservices may not be available in your region. Check your local operating procedures before proceeding. Figure 1-12 shows the **Teleservices Test** dialog box.

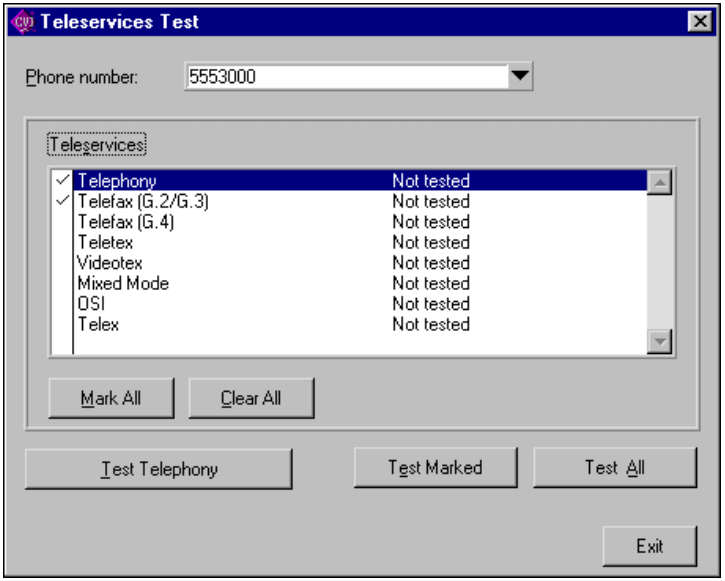

Figure 1-12. Teleservices Test

The **Teleservices Test** dialog box has the following features:

- Phone number—Type in the number to dial or use the down arrow button to select the telephone number to dial. You can select recently dialed numbers, numbers for this location, or stored numbers. You can add phone numbers to the list under **Options»Stored Numbers**.
- Teleservices—Click the name of the teleservice to highlight a single service that you want to test. Click to the left of the teleservice name to mark a teleservice to be tested with a group.You can mark several tests and run the tests all at once.

Click **Mark All** to mark all of the Teleservices. Click **Clear All** to unmark all the Teleservices selected.

- **Test** (*highlighted service*)—Click this button to run only the highlighted test. The test button changes to correspond to the highlighted service.
- **Test Marked**—Click this button to test all the teleservices marked for group testing. This button is gray if no tests are marked.
- **Test All**—Click this button to test all of the teleservices.
- **Exit**—Click this button to return to the main screen.

Supplementary Services Verification

Supplementary Services verification is a test to confirm that the central office is programmed with the supplementary services the subscriber requested. All these supplementary services may not be available in your region. Check your local procedures before proceeding. Figure 1-13 shows the **Supplementary Services Test** dialog box.

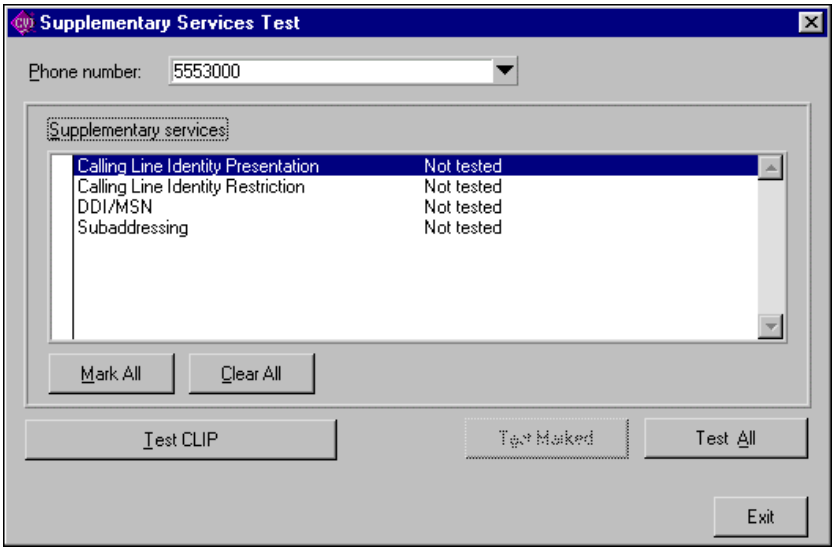

Figure 1-13. Supplementary Services Test

The **Supplementary Services Test** dialog box has the following features:

- Phone number—Type in the number to dial or use the down arrow button to select the telephone number to dial. You can select recently dialed numbers, numbers for this location, or stored numbers. You can add phone numbers to the list under **Options»Stored Numbers**.
- Supplementary services—Click the name of the supplementary service to highlight a single service that you want to test. Click to the left of the supplementary service name to mark a teleservice for group testing. Click **Mark All** to mark all of the supplementary services numbers. Click **Clear All** to unmark all the supplementary services selected.
- **Test** (*highlighted service*)—Click this button to run only the highlighted test. The test button changes to correspond to the highlighted service.
- **Test Marked**—Click this button to test marked for group testing services. This selection is gray if no tests are marked.
- **Test All**—Click this button to test the service selected.
- **Exit**—Click this button to return to the main screen.
- The binary value of the octet.
- Plain text explanation of the field.

Click the **Previous** button to show the previous packet in the **Protocol Decode** view.

Click the **Next** button to show the next packet in the **Protocol Decode** view.

Click the **Close** button to return to **Protocol Decode**.

Power Supply Checks

This test checks to see if power supply 1 (PS1) and power supply 2 (PS2) on the S/T interface are operating correctly. Figure 1-14 shows the **Power Supply Checks** screen.

☞ **Note** ***This test cannot be run if the U interface is selected from the Options menu.***

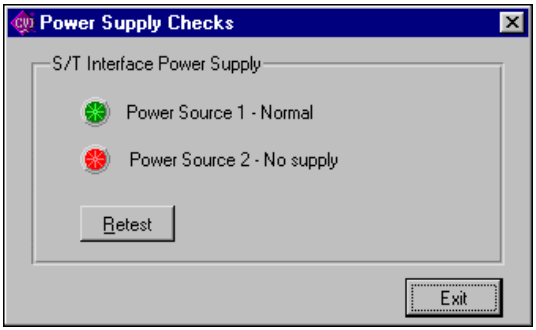

Figure 1-14. Power Supply Checks

The following list shows possible power supply LED colors and their meaning:

- A green LED indicates a normal power supply.
- A yellow LED indicates a restricted power supply.
- A red LED indicates no power supply or that the power supply is too high.

Click the **Retest** button to repeat the power supply checks.

Click the **Exit** button to return to the main screen.

Protocol Decode

The **Protocol Decode** dialog box gives you the ability to look at the layer 2 and layer 3 messages that are sent between the NI 6830 and the central office. Figure 1-15 shows the **Protocol Decode** dialog box.

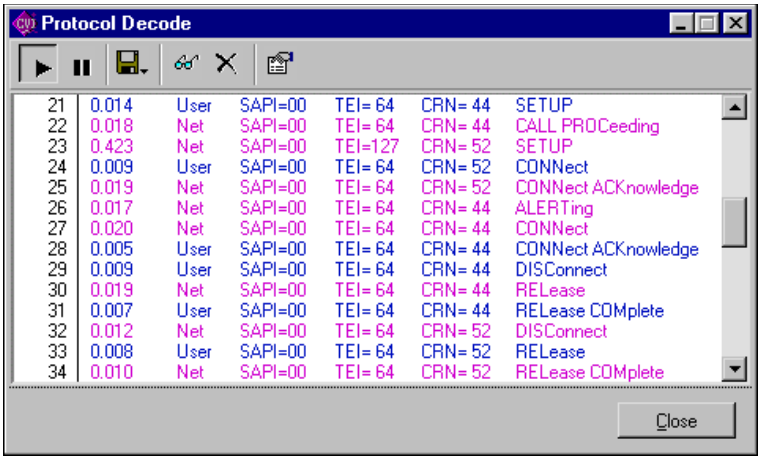
Protocol Decode
21 0.014 User SAPI=00 TEI= 64 CRN= 44 SETUP
22 0.018 Net SAPI=00 TEI= 64 CRN= 44 CALL PROCeeding
23 0.423 Net SAPI=00 TEI=127 CRN= 52 SETUP
24 0.009 User SAPI=00 TEI= 64 CRN= 52 CONNect
25 0.019 Net SAPI=00 TEI= 64 CRN= 52 CONNect ACKnowledge
26 0.017 Net SAPI=00 TEI= 64 CRN= 44 ALERTing
27 0.020 Net SAPI=00 TEI= 64 CRN= 44 CONNect
28 0.005 User SAPI=00 TEI= 64 CRN= 44 CONNect ACKnowledge
29 0.009 User SAPI=00 TEI= 64 CRN= 44 DISConnect
30 0.019 Net SAPI=00 TEI= 64 CRN= 44 RELease
31 0.007 User SAPI=00 TEI= 64 CRN= 44 RELease COMplete
32 0.012 Net SAPI=00 TEI= 64 CRN= 52 DISConnect
33 0.008 User SAPI=00 TEI= 64 CRN= 52 RELease
34 0.010 Net SAPI=00 TEI= 64 CRN= 52 RELease COMplete
Close

Figure 1-15. Protocol Decode

The **Protocol Decode** dialog box shows the list of messages sent and received by the NI 6830, including the following items, shown from left to right:

- The sequential number of the packet, transmitted or received, since you stated the ISDN tester.
- The time, in seconds, since the last packet.
- The source of the packet—either user or network (central office).
- Service access point identifiers (SAPI) and TEIs, as well as, call reference numbers (CRNs) with layer 3 messages.
- An explanation of the packet type.

The following icons are in the toolbar of the **Protocol Decode** dialog box. Click one of the following icons to select the desired option:

- **Resume**—Click this icon to continue the protocol decode after pausing.

- **Pause**—Click this icon to pause the protocol decode.

- **Save**—Click this icon to save information from the **Protocol Decode** dialog box to a file. You have three choices under save:
  - Save Packet saves the list for this view only.
  - Save Full Packet Decode saves the complete packet details.
  - Save Raw Packet Data saves the raw binary data.

- **View**—Click this icon to view a detailed decode of the highlighted packet described in the next section.

- **Delete**—Click this icon to clear the packet list.

- **Configure**—Click this icon to configure the filters. Refer to the *Filters* section for further information.

Click the **Close** button to return to the main screen.

Note ***You can leave the*** Decode Packet ***screen active while you run other test functions with the NI 6830.***

Figure 1-16 shows the **Detailed Decode Packet** view.

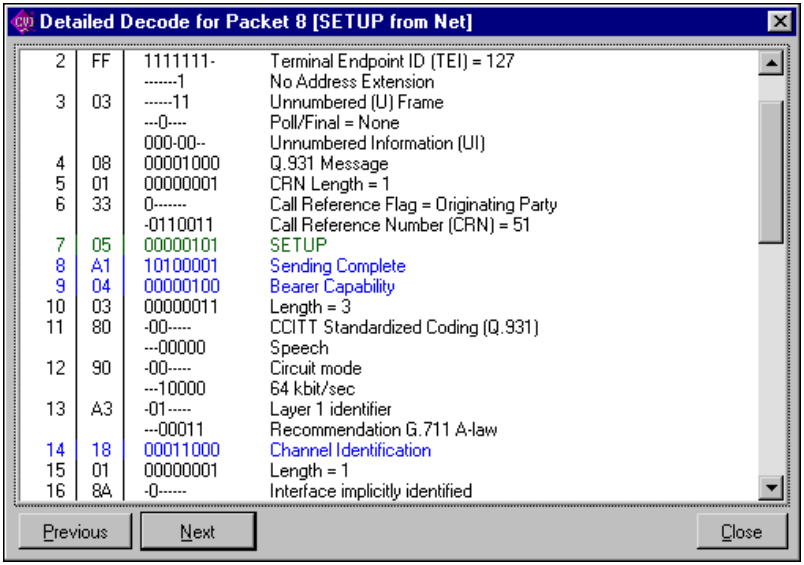
Detailed Decode for Packet 8 [SETUP from Net]
2 FF 1111111- Terminal Endpoint ID (TEI) = 127
-------1 No Address Extension
3 03 ------11 Unnumbered (U) Frame
---0---- Poll/Final = None
000-00-- Unnumbered Information (UI)
4 08 00001000 Q.931 Message
5 01 00000001 CRN Length = 1
6 33 0------- Call Reference Flag = Originating Party
-0110011 Call Reference Number (CRN) = 51
7 05 00000101 SETUP
8 A1 10100001 Sending Complete
9 04 00000100 Bearer Capability
10 03 00000011 Length = 3
11 80 -00----- CCITT Standardized Coding (Q.931)
---00000 Speech
12 90 -00----- Circuit mode
---10000 64 kbit/sec
13 A3 -01----- Layer 1 identifier
---00011 Recommendation G.711 A-law
14 18 00011000 Channel Identification
15 01 00000001 Length = 1
16 8A -0------ Interface implicitly identified
Previous
Next
Close

Figure 1-16. Detailed Decode Packet View

The **Detailed Decode Packet** view shows the following information, from left to right:

- The zero-based octet number for this field.
- The hexadecimal value of the octet.

Options

Click the **Options** button to change the NI 6830 settings.

The NI 6830 **Options** dialog box contains the following tabs:

- **Terminal**—This tab sets the telephone numbers and SPIDs, if applicable, assigned to the subscriber.
- **ISDN Interface**—This tab selects the U or S/T interface for testing and permits access to other advanced features.
- **General**—This tab sets the general parameters of the ISDN tester and the loopback features for incoming calls.
- **Stored Numbers**—This tab allows you to store numbers for use in the individual test functions.
- **Filters**—This tab lets you set the protocol filters used for protocol decoding.
- **About**—This tab gives you information about the NI 6810 tester and allows you to perform a self-test.

Click the **OK** button to accept changes and return to the main screen.

Click the **Cancel** button to cancel changes and return to the main screen.

The various options are described in detail in the following sections.

Terminal

- Networks without SPID

Use the **Terminal** tab, shown in Figure 1-17, to change the telephone numbers assigned to the customer.

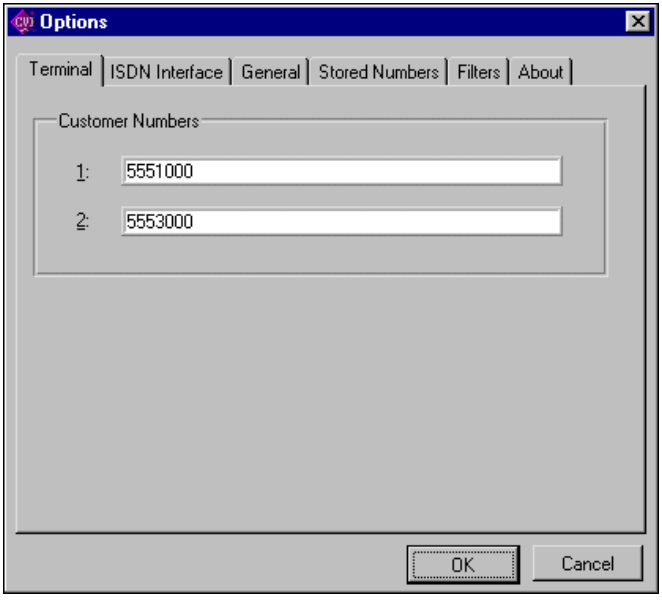

Figure 1-17. Terminal Tab without SPID

Enter the directory numbers assigned to the customer in the Customer Numbers fields.

- Networks with SPID

Use the **Terminal** tab, shown in Figure 1-17, to change the telephone numbers assigned to the customer.

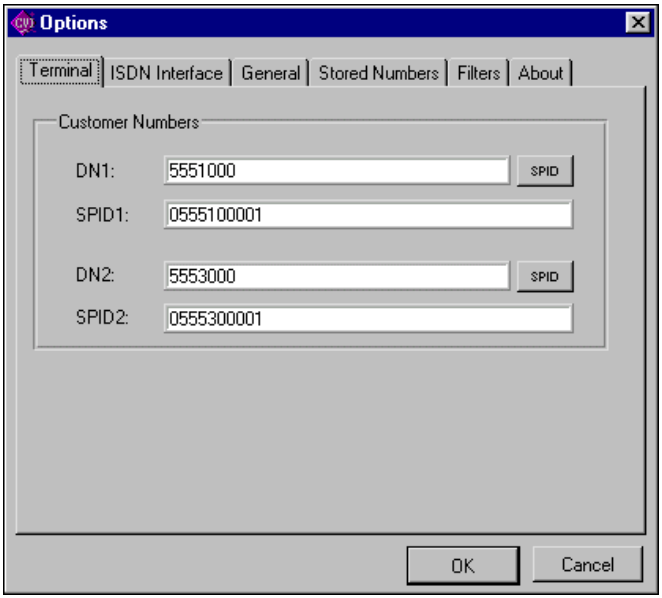

Figure 1-18. Terminal Tab with SPID

Enter the directory numbers assigned to the customer in the Customer Numbers fields.

ISDN Interface

Use the **ISDN Interface** tab, shown in Figure 1-19, to change the line interface and other advanced settings.

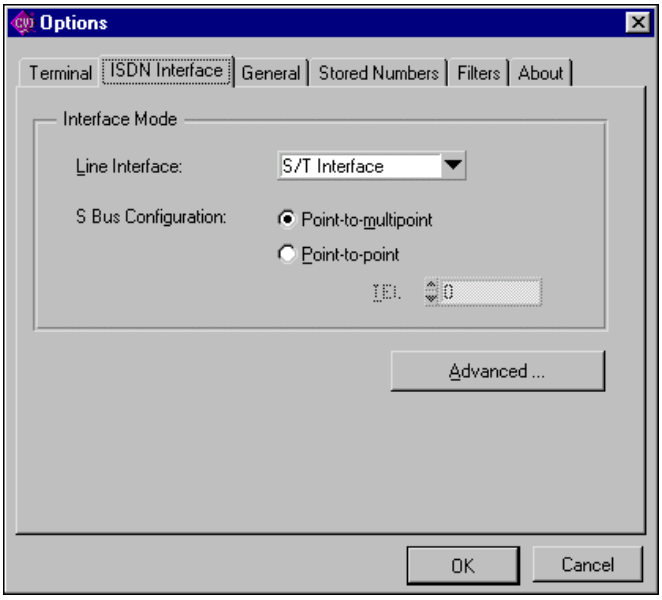

Figure 1-19. ISDN Interface Tab

Use the down arrow button of the Line Interface list box to select either the S/T or U interface. If you select the S/T interface, you can then select one of the following items:

- Point-to-multipoint if you can connect more than one piece of terminal equipment (TE) to the line. This is the most common configuration.
- Point-to-point if you can connect only one TE to the line. You may need to specify terminal endpoint identifier if it is not zero.

Click the **Advanced** button, shown in Figure 1-20, to change the ISDN protocol, SPID format, and activation timeout.

Note ***Check your local procedures before changing any advanced ISDN settings.***

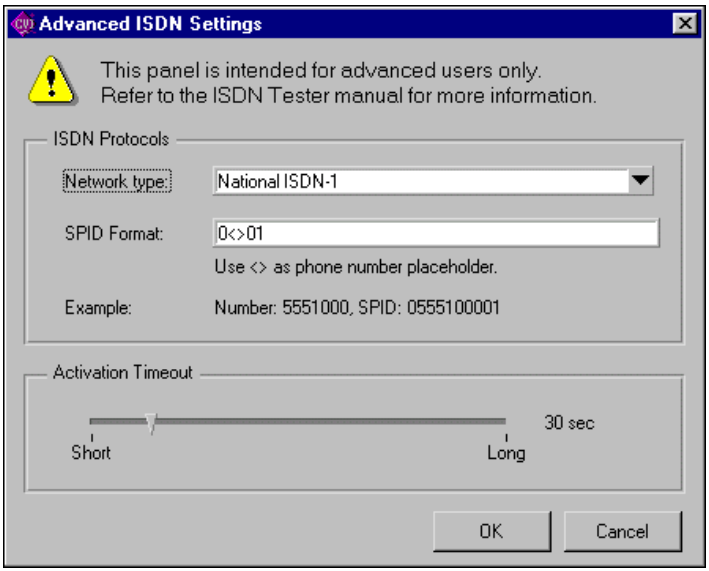

Figure 1-20. Advanced ISDN Settings

Use the down arrow button of the Network type list box to select the network type. You can choose any one of the following formats:

- National ISDN-1—North American format
- Euro-ISDN— European harmonized standard

Note ***The European harmonized standard may also apply in other countries.***

- AT&T Custom—older North American format
- Northern Telecom Custom—older North American format
- Siemens Custom—older European format
- NTT—Japanese format
- VN4—older French format
- 1TR6—older German format
- ISDN2—United Kingdom format
- AusTel—Australian format

If you choose a network type that requires SPID, the NI 6830 prompts you to enter the format of the SPID. Enter the format used in your area. For example if you enter 0<>01, the software automatically generates SPID 0555123401 for a customer number of 5551234.

Adjust the pointer on the Activation Timeout bar between Short and Long to set the time during which the NI 6830 attempts to activate the ISDN line. The time you select displays on the screen to the right of the bar.

Click the **OK** button to accept changes and return to the **Options** dialog box.

Click the **Cancel** button to cancel changes and return to the **Options** dialog box.

General

Use the **General** tab, shown in Figure 1-21, to change general settings and define which types of calls to loop back.

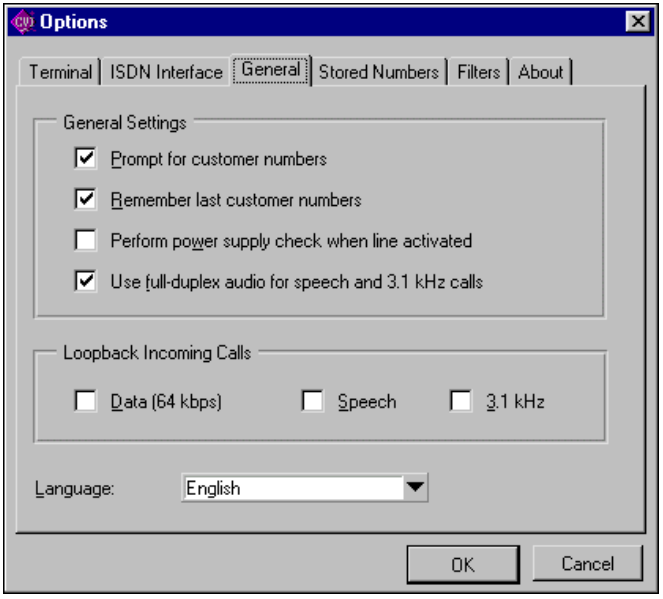

Figure 1-21. General Tab

Check each box in the General Settings box to activate or deactivate the following options:

- Prompt for customer numbers—The NI 6830 prompts you for the subscriber numbers each time you run the application software.
- Remember last customer numbers—The NI 6830 stores the dialed numbers in memory.

- Perform power supply check when line activated—The NI 6810 automatically checks the PS1 and PS2 power supplies when the S/T interface is activated.
- Use full-duplex audio for speech and 3.1 kHz calls—The NI 6830 enables the use of simultaneous audio input and output. Some computer sound cards do not support full-duplex operation.

☞ **Note** ***Your PC must support full-duplex audio to use this function.***

Check each box in the Loopback Incoming Calls box to activate or deactivate the following options:

- Data (64 kbps)—The NI 6830 loops back data calls.
- Speech—The NI 6830 loops back speech calls.
- 3.1 kHz—The NI 6830 loops back 3.1 kHz calls.

Stored Numbers

Use the **Stored Numbers** tab, shown in Figure 1-22, to change the list of stored numbers available for outward-bound calls.

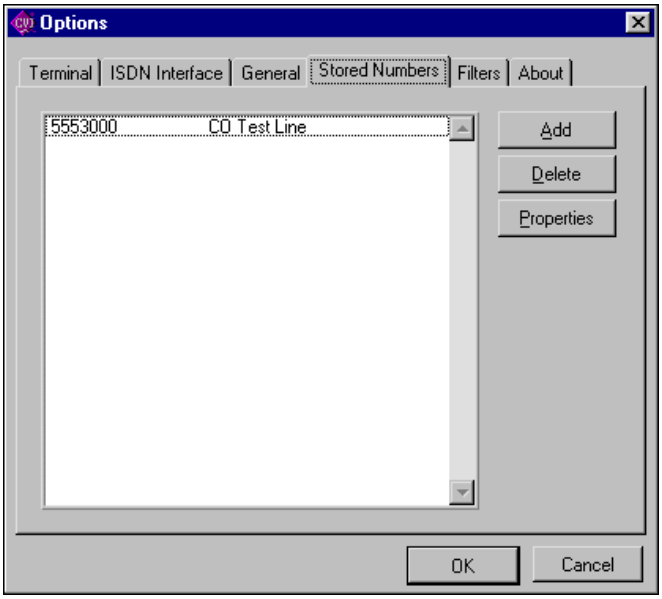

Figure 1-22. Stored Numbers Tab

To add a new number to the list of stored numbers, click the **Add** button. The dialog box shown in Figure 1-23 appears. Enter the number you want

to store and an optional description. The description appears along with the number in the **Phone number** field in tests that require outward dialing.

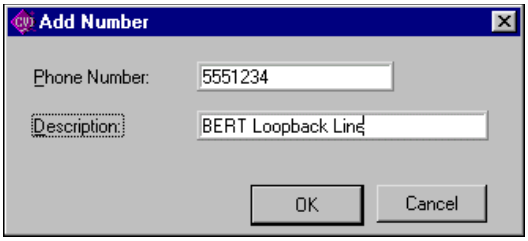

Figure 1-23. Properties

To delete a number, highlight it in the list and click the **Delete** button.

To edit a phone number or its description, select the number in the list and click **Properties**. A dialog box appears similar to the **Add Number** dialog box above. From this dialog box you can edit the number or its description.

Filters

Use the **Filters** tab, shown in Figure 1-24, to set the protocol filters for the Protocol Decode function.

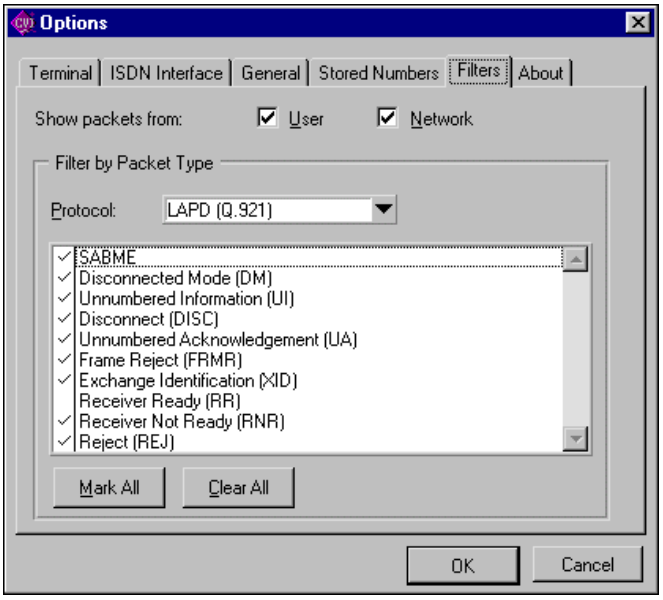

Figure 1-24. Filters Tab

Check the **Show packets from** checkboxes if you want to display packets from the user, the network (central office), or both.

You can disable the display of individual protocol messages. To hide a particular message type, clear the checkmark next to the message name.

You can choose from the following protocols:

- LAPD (Q.921)
- TEI Management
- Q.931 Messages

Click to the left of the message name to mark a message type. Click the **Mark All** button to mark all the messages. Click the **Clear All** button to unmark all the messages.

About

The **About** tab, shown in Figure 1-25, displays the version of the NI 6810 software and allows you to perform a self-test.

Figure 1-25. About Tab

Click the Self-Test button to run a diagnostic test on the NI 6810 PCMCIA card.

Note ***This self-test tests only the NI 6810 hardware and software, not the ISDN line.***

2

Using the NI 6830 Sequence Editor

You use the Test Sequence Editor to modify or create new test sequences for the NI 6830. You can use it to add or remove tests, modify test parameters, and control sequence execution.

To launch the editor, click **Start»Programs»National Instruments ISDN Tester»Test Sequence Editor**.

Figure 2-1 shows the main screen of the **Test Sequence Editor**. The main screen contains menus and a toolbar for easy access to common operations, and the sequence display area. When you launch the Test Sequence Editor, it starts with a blank test sequence. If you are creating a new sequence, you can start adding tests immediately. To modify an existing sequence, select **Open** from the **File** menu and chose the sequence you want to edit.

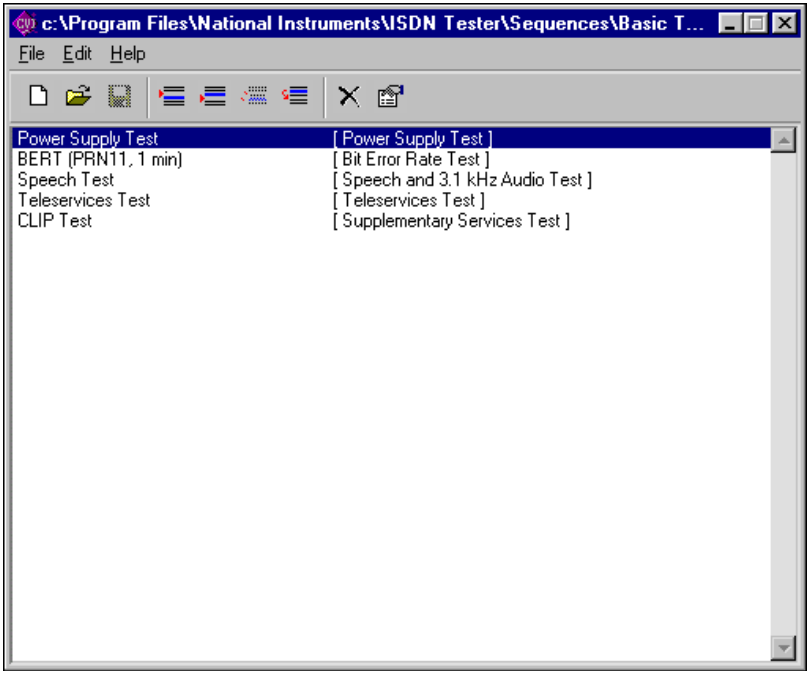
c:\Program Files\National Instruments\ISDN Tester\Sequences\Basic T...
File Edit Help
Power Supply Test [Power Supply Test]
BERT (PRN11, 1 min) [Bit Error Rate Test]
Speech Test [Speech and 3.1 kHz Audio Test]
Teleservices Test [Teleservices Test]
CLIP Test [Supplementary Services Test]

Figure 2-1. ISDN Test Sequence Editor

File Menu

The **File** menu contains operations that affect the test sequence as a whole and includes the following items:

- **New**—Create a new sequence.
- **Open**—Open an existing sequence.
- **Save**—Save the sequence with an existing name.
- **Save As**—Save the sequence with a new name.
- **Properties**—Modify the properties of the sequence.
- **Exit**—Exit the application.

Edit Menu

The **Edit** menu contains operations that affect individual tests and includes the following items:

- **Add test before**—Add a new test in the sequence before the highlighted test.
- **Add test after**—Add a new test in the sequence after the highlighted test.
- **Move Test Up**—Move an existing test up in the sequence.
- **Move Test Down**—Move an existing test down in the sequence.
- **Rename Test**—Rename the highlighted test.
- **Delete Test**—Delete the highlighted test.
- **Configure Test**—Configure the highlighted test. You can also double-click a highlighted test to configure the test.

Help Menu

The **Help** menu contains the **About** item, which you use to view information about the Sequence Editor.

Toolbar Icons

The most common operations are also found under the toolbar icons and include the following items:

- **New**—Create a new sequence.
- **Open**—Open an existing sequence.
- **Save**—Save the sequence with an existing file name.
- **Add before**—Add a new test in the sequence before the highlighted test.

- **Add after**—Add a new test in the sequence after the highlighted test.
- **Move up**—Move the highlighted test above the previous test
- **Move down**—Move the highlighted test below the next test
- **Delete**—Delete the highlighted test.
- **Configure**—Configure the parameters of the highlighted test.

Adding a New Test

To add a new test, click either the **Add Before** or **Add After** button on the toolbar. You can add more than one instance of a test. For example, you may want to run a Speech test twice, once on each bearer channel.

When you add a new test, you are prompted with the dialog box shown in Figure 2-2. In the Test name field, enter a short name for this test. For example, if you are adding a Bit Error Rate Test that you plan to run for 1 minute, you can call it 1 min BERT. Next, pick an operation you want to perform as part of the test from the Function control. Currently, the following operations are available:

- **Line Status Test**
- **Bit Error Rate Test**
- **Speech and 3.1 kHz Audio**
- **Teleservices**
- **Supplementary Services**
- **Power Supply Checks**

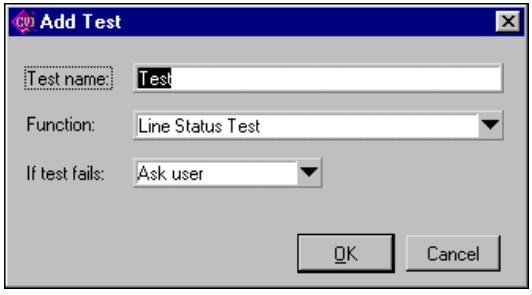

Figure 2-2. Add Test

You can also configure the behavior of the sequence when the test fails. The failing condition depends on the individual test. You can choose from the following options:

- Ask user (default)—The test sequencer notifies you that the test failed. You can then select to either continue with the sequence or to abort sequence execution.
- Fail sequence and stop—The test sequence aborts the sequence execution and considers the sequence failed.
- Continue—The sequencer continues running the tests in sequence.

When you click **OK**, the test is added to the sequence and shown in the test sequence display area. You see the test name as well as the type of the operation.

Changing Test Parameters

When you add a test, it is configured with the default parameters. For example, the Bit Error Rate Test by default is configured to perform a self-call, one minute test using a PRN15 (2047-bit) pattern. To change these settings, double-click the test name or select the test and click **Configure** on the toolbar. A test-specific configuration dialog box opens. For instance, the **BERT Parameters** dialog box is shown in Figure 2-3. The set of parameters you can change is similar to the BERT test dialog box in the ISDN Tester software.

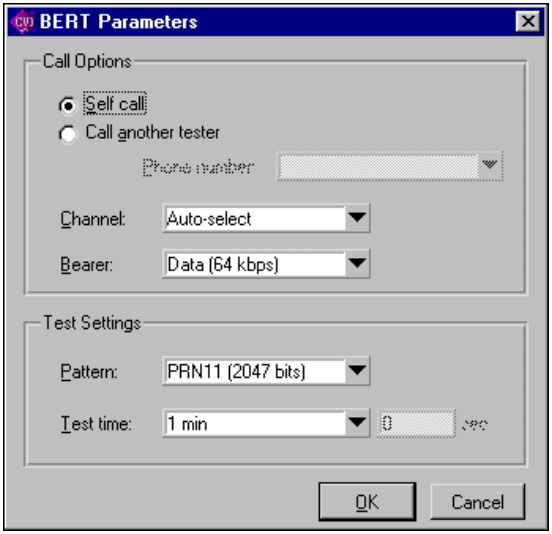

Figure 2-3. BERT Parameters

Modifying an Existing Test Sequence

To remove a test, simply highlight the test and click the **Delete** button on the toolbar.

To rename a test, select the test and then choose **Rename** from the **Edit** menu. The name of the test turns into an edit field, allowing you to change the name of the test.

You can also modify the order of tests in the sequence. To move the test closer to the start of the sequence, select the test and click the **Move up** button on the toolbar. Similarly, you can move the test later in the sequence using the **Move down** button.

Editing Sequence Properties

Each test sequence has a number of parameters that control the execution of the sequence. You can configure these by selecting **Properties** from the **File** menu. The **Sequence Properties** dialog box is shown in Figure 2-4.

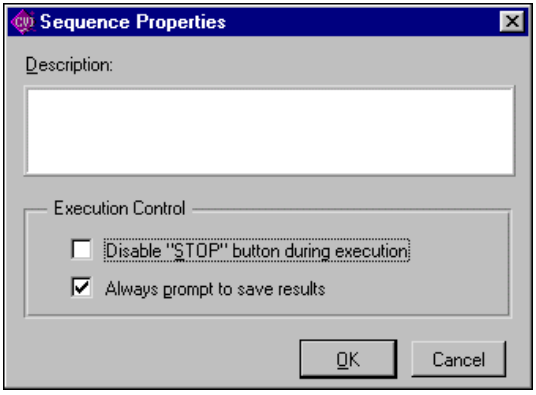

Figure 2-4. Sequence Properties

From this dialog box you can set the following parameters:

- **Description**—Type in a short description of the sequence.
- **Disable STOP button during execution**—Select this option if you do not want the ability to stop during a sequence.
- **Always prompt to save results**—Select this option if you want the NI 6830 to prompt you to save the results when the execution of this test sequence completes.

Organizing Test Sequences

When you click the **Run Test Sequence** button in the ISDN Tester application, it looks for available sequences in the subdirectory called `Sequences` located in the directory where the ISDN Tester application is installed.

This path is typically `C:\Program Files\National Instruments \ISDN Tester\Sequences`. The Test Sequence Editor defaults to this directory when showing file dialog boxes during open and save operations.

A

Customer Communication

For your convenience, this appendix contains forms to help you gather the information necessary to help us solve your technical problems and a form you can use to comment on the product documentation. When you contact us, we need the information on the Technical Support Form and the configuration form, if your manual contains one, about your system configuration to answer your questions as quickly as possible.

National Instruments has technical assistance through electronic, fax, and telephone systems to quickly provide the information you need. Our electronic services include a bulletin board service, an FTP site, a fax-on-demand system, and e-mail support. If you have a hardware or software problem, first try the electronic support systems. If the information available on these systems does not answer your questions, we offer fax and telephone support through our technical support centers, which are staffed by applications engineers.

Electronic Services

Bulletin Board Support

National Instruments has BBS and FTP sites dedicated for 24-hour support with a collection of files and documents to answer most common customer questions. From these sites, you can also download the latest instrument drivers, updates, and example programs. For recorded instructions on how to use the bulletin board and FTP services and for BBS automated information, call 512 795 6990. You can access these services at:

United States: 512 794 5422
Up to 14,400 baud, 8 data bits, 1 stop bit, no parity

United Kingdom: 01635 551422
Up to 9,600 baud, 8 data bits, 1 stop bit, no parity

France: 01 48 65 15 59
Up to 9,600 baud, 8 data bits, 1 stop bit, no parity

FTP Support

To access our FTP site, log on to our Internet host, `ftp.natinst.com`, as `anonymous` and use your Internet address, such as `joesmith@anywhere.com`, as your password. The support files and documents are located in the `/support` directories.

Fax-on-Demand Support

Fax-on-Demand is a 24-hour information retrieval system containing a library of documents on a wide range of technical information. You can access Fax-on-Demand from a touch-tone telephone at 512 418 1111.

E-Mail Support (Currently USA Only)

You can submit technical support questions to the applications engineering team through e-mail at the Internet address listed below. Remember to include your name, address, and phone number so we can contact you with solutions and suggestions.

`support@natinst.com`

Telephone and Fax Support

National Instruments has branch offices all over the world. Use the list below to find the technical support number for your country. If there is no National Instruments office in your country, contact the source from which you purchased your software to obtain support.

Country	Telephone	Fax
Australia	03 9879 5166	03 9879 6277
Austria	0662 45 79 90 0	0662 45 79 90 19
Belgium	02 757 00 20	02 757 03 11
Brazil	011 288 3336	011 288 8528
Canada (Ontario)	905 785 0085	905 785 0086
Canada (Québec)	514 694 8521	514 694 4399
Denmark	45 76 26 00	45 76 26 02
Finland	09 725 725 11	09 725 725 55
France	01 48 14 24 24	01 48 14 24 14
Germany	089 741 31 30	089 714 60 35
Hong Kong	2645 3186	2686 8505
Israel	03 6120092	03 6120095
Italy	02 413091	02 41309215
Japan	03 5472 2970	03 5472 2977
Korea	02 596 7456	02 596 7455
Mexico	5 520 2635	5 520 3282
Netherlands	0348 433466	0348 430673
Norway	32 84 84 00	32 84 86 00
Singapore	2265886	2265887
Spain	91 640 0085	91 640 0533
Sweden	08 730 49 70	08 730 43 70
Switzerland	056 200 51 51	056 200 51 55
Taiwan	02 377 1200	02 737 4644
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Operating system (include version number) _____

Clock speed _____MHz RAM _____MB Display adapter _____

Mouse ___yes ___no Other adapters installed_____

Hard disk capacity _____MB Brand_____

Instruments used _____

_____

National Instruments hardware product model _____ Revision _____

Configuration _____

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Configuration _____

The problem is: _____

_____

_____

_____

_____

List any error messages: _____

_____

_____

The following steps reproduce the problem: _____

_____

_____

_____

_____

NI 6830 Hardware and Software Configuration Form

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Edition Date: December 1998

Part Number: 322024A-01

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Glossary

Prefix	Meaning	Value
p-	pico	10^{-12}
n-	nano-	10^{-9}
µ-	micro-	10^{-6}
m-	milli-	10^{-3}
k-	kilo-	10^{3}
M-	mega-	10^{6}
G-	giga-	10^{9}
t-	tera-	10^{12}

Numbers/Symbols

2B1Q — The U interface line code used in NI1 (National Implementation) ISDN and Euro-ISDN.

4B3T — An older U interface line code found in Europe, but not used with Euro-ISDN.

A

AMI — alternate mark inversion—An older U interface line code used in North America, but not part of National Implementation ISDN.

analog signals — Electrical signals that are a copy or analog of speech or data. A POTS telephone set converts speech into analog signals. A POTS modem translates data into analog signals.

AT&T custom — An older AMI-based U interface line used in North America with some AT&T switches, but not part of National Implementation ISDN.

B

B channel	One of two bearer channels available on a basic rate ISDN line for carrying voice or data. Each B channel carries 64 kbps of data.
BRI	basic rate ISDN—The basic ISDN service available to subscribers. BRI is made up of two B channels and one D channel.

C

central office	The location where telephone company switches are located.

D

D channel	A third channel on basic rate ISDN used mainly for signaling between the subscriber and the central office. The D channel carries 16 kbps of data.
digital signals	Electrical signals that use discrete voltage levels to represent the amplitude of an analog signal at any point in time. The digital signals are transmitted on the telephone line then converted back to electrical signals at the far end. Digital signals are not affected by noise as much as analog signals.

I

ISDN	integrated services digital network—ISDN offers a large number of voice and data services that have been integrated onto a single line. ISDN is transmitted by digital signals over the public telephone network.

L

Layer 1 (physical layer)	The protocol layer that is responsible for managing the flow of raw data on the ISDN line.
Layer 2 (data layer)	The protocol layer that is responsible for initiating ISDN calls. Layer 2 adds addresses and controls to the data in the ISDN signal.

Layer 3 (network layer)	The protocol layer that is responsible for the setup of ISDN call. Layer 3 adds messages to communicate between the subscriber and the central office switch. For example, setting up a call between two ISDN subscribers through a central office switch would involve the following exchange of messages: The Caller sends a SETUP message to the Switch. The Switch replies with a CALL PROC (proceed) message to the Caller. The Switch sends a SETUP message to the Receiver. The Receiver replies with an ALTERTING message to the Switch. The Switch sends an ALERTING message to the Caller. The Caller sends a CONNECT message to the Switch. The Switch sends a CONNECT message to the Receiver. The Receiver sends a CONNECT ACK (acknowledge) message to the Switch. The Switch sends a CONNECT ACK (acknowledge) message to the Caller.
line code	A means of encoding digital data. 2B1Q uses four signal levels to encode data. AMI uses three signal levels to encode data.

N

NT1	network termination 1—A device that converts the two-wire U interface from the central office to the four-wire S/T interface of the customer terminal equipment.
northern telecom custom	An older U interface line found in North America with some DMS central office switches, but not used with National Implementation ISDN.

P

POTS	plain old telephone service—The basic analog telephone service found in the world.
protocols	Basic rules for sending digital data on an ISDN line, similar to the rules of a language for putting letters together to form words and words together to form sentences.

S

S/T Interface	The four wires (two pairs) that run from the network termination to the customer's ISDN equipment. Data on the S/T interface is independent of the U interface line coding (2B1Q, 4B3T, etc.).
SAPI	service access point identifier—A Layer 2 message that identifies the origin of ISDN data.
SPID	service provider ID—An identification code that must be sent to setup the ISDN call. The SPID usually consists of the telephone number plus additional digits to identify different ISDN services. If the SPID is not sent correctly, the call will initiate at Layer 2, but will not setup at Layer 3. SPIDs are used in North America, but not in most of the rest of the world.
supplementary services	Additional ISDN services available in some areas. These services must be enabled in both the central office switch and the customer equipment. Supplementary services include: calling line identification presentation (CLIP) calling line restriction (CLIR) direct dial in (DDI) multiple subscriber number (MSN) subaddressing (SUB)

T

TA	terminal adapter—A device or circuit that lets non-ISDN devices function on the S/T interface.
TE1	terminal equipment 1—Any equipment on the S/T bus that is designed to work directly with ISDN.

teleservices	Additional ISDN services available in some areas. These services must be enabled in both the Central Office switch and the customer equipment. Teleservices include: Telephony Telefax, and Telefax 4 Teletex Videotex Mixed mode teletex/telefax OSI Telex
TEI	terminal endpoint identifier—A Layer 2 message that identifies the destination for ISDN data.

U

U Interface	The single pair that runs from the central office (or remote cabinet) to the customer's Network Termination device.

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